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GROW MORE GRASS

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CONTROL BIG SAGEBRUSH WITH CHEMICALS AND GROW MORE GRASS

Prepared by
N. A. Kissinger, Jr. and Richard M. Hurd
Range Conservationists

Big sagebrush-grassland is one of the most extensive of the western range types. In Wyoming alone, big sagebrush (*Artemisia tridentata*) is the dominant plant on an estimated 20 million acres. This is only about one-fifth of the total big sagebrush land area in the 11 western range states. Some big sagebrush lands have been converted to productive farms by irrigation and others to small-grain production by dry-farming. The majority, however, are devoted almost exclusively to grazing by domestic livestock and to wildlife habitats.

A GREAT NATURAL RESOURCE

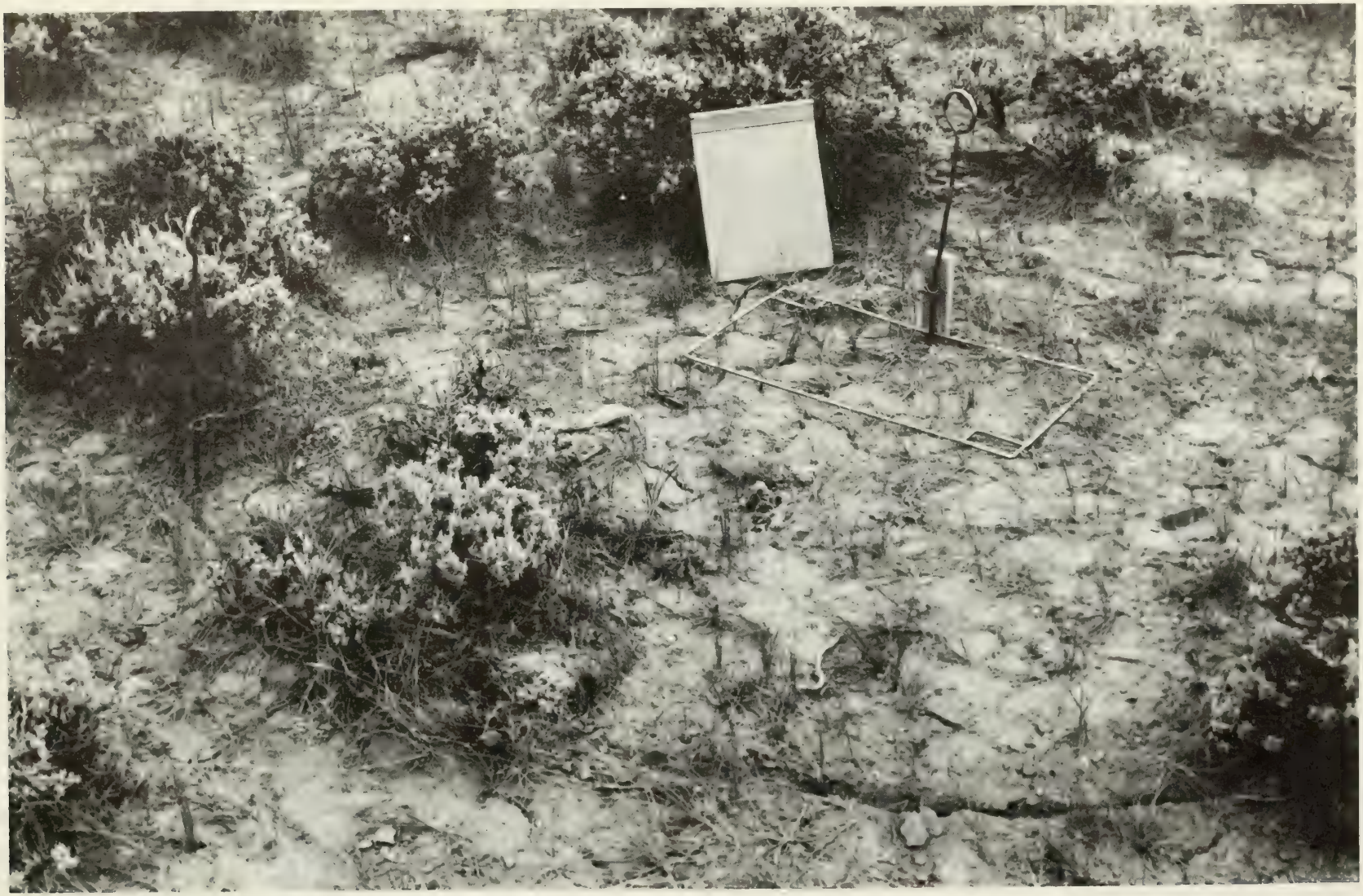
On some big sagebrush ranges a favorable balance exists between the sagebrush and the associated perennial grasses. The sagebrush plants are adequately spaced so that substantial amounts of palatable forage are produced in the openings. Other ranges with comparable soils and precipitation may have too many sagebrush plants. In these areas the perennial grasses, when present, occur in sparse stands and produce relatively little forage. Both grasses and sagebrush are competing for soil moisture and current range use may favor sagebrush to the detriment of the grasses. The grasses are capable of spreading, however and often a productive balance can be achieved by reducing the sagebrush competition.

SAGEBRUSH AND SPARSE GRASS

Research in methods of reducing sagebrush competition was given new stimulus by the development of selective chemical herbicides. In 1949 the U. S. Forest Service and the Bureau of Land Management started a cooperative sagebrush-control research project near Lander, Wyoming. Some 350 acres have been sprayed by airplane or with a tractor-mounted sprayer to determine: (1) which chemicals were effective and how much of each was needed for satisfactory sagebrush control, (2) the period wherein big sagebrush was most susceptible to chemical treatment, (3) the minimum amount of water or diesel oil needed for good spray coverage, and (4) the response of all the vegetation to chemical treatments.

CHEMICAL APPLICATION WITH TRACTOR-MOUNTED SPRAYER

The experimental plots were sampled for sagebrush kill 1 year after treatment. On the basis of these samples some treatments were discarded and others were given additional trials. In these trials the sagebrush and all associated vegetation were inventoried before treatment on permanently located sample plots. By reinventorying these permanent plots in subsequent years research workers will learn the effects of different treatments on all vegetation, the response of associated plants to reduced sagebrush competition, and how soon retreatment is necessary.



SAMPLE PLOT BEFORE SPRAYING

Based on sagebrush plants killed per dollar of treatment cost, 1 pound (acid equivalent) of 2, 4, 5-T isopropyl and amyl ester mixed with diesel oil to a total volume of 3 gallons per acre has been the most efficient treatment tested. Changes in chemical prices might alter this finding. Other promising treatments include 1 pound of 2, 4, 5-T low-volatility (propylene glycol butyl ether) ester per acre and 2 pounds of 2, 4-D, either isopropyl or low-volatility esters, per acre. At 3 gallons of spray solution per acre, diesel oil has generally been a better carrier for all chemicals than water.

SAGEBRUSH IN DARK STRIPS KILLED BY 2,4,5-T

The growth stage at which big sagebrush was sprayed influenced its susceptibility to all treatments. 2, 4, 5-T isopropyl and amyl ester was most effective when applied between May 20 and June 10. In the study area, this was the period when big sagebrush twigs and flower stalks were making their most rapid growth and when the native Sandberg and Cusick bluegrasses were in bloom. Earlier or later spraying consistently resulted in lower sagebrush kills. The same relationship was observed, using 2, 4-D isopropyl ester. In contrast, the low-volatility esters of 2, 4-D or 2, 4, 5-T can apparently be applied from 5 to 10 days earlier without reducing their effectiveness.

One pound of 2,4,5-T isopropyl and amyl ester mixed with diesel oil to a total volume of 3 gallons per acre and applied –

KILLED 66 PERCENT OF THE SAGEBRUSH PLANTS

MAY 10 to MAY 19

KILLED 84 PERCENT OF THE SAGEBRUSH PLANTS

MAY 20 to JUNE 10

KILLED 52 PERCENT OF THE SAGEBRUSH

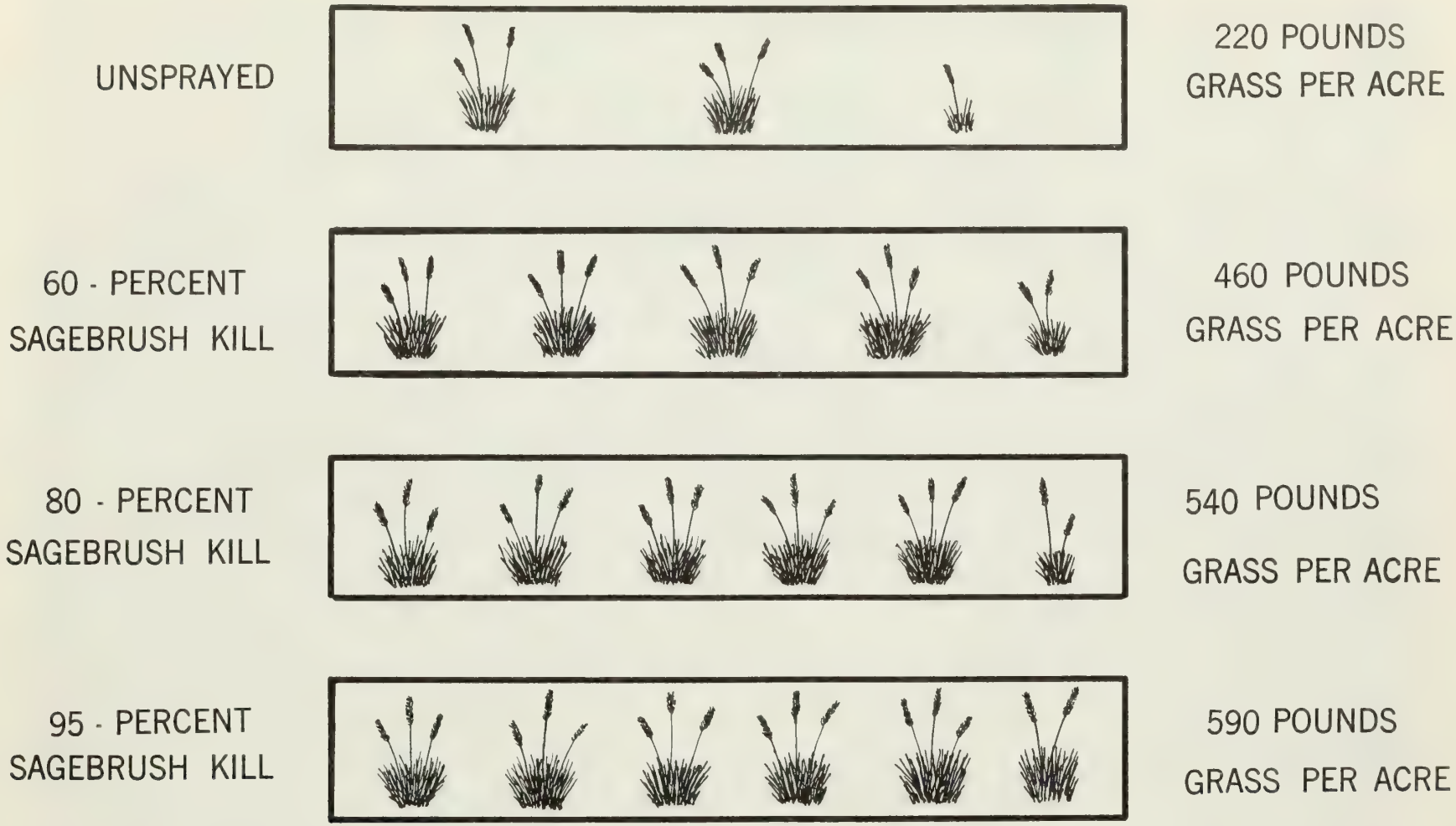
JUNE 11 to JUNE 26

SPRAYING DATE WAS IMPORTANT

In order to measure the effects of sagebrush control on grass production, parts of 11 plots sprayed in 1949 and 9 adjacent unsprayed plots were fenced early in 1951 to exclude grazing. Grass samples were clipped inside these fenced exclosures on both sprayed and unsprayed plots in 1951 and 1952. Air-dry grass production on unsprayed plots (pictured on page 5) averaged 220 pounds per acre. Where 95 percent of the sagebrush plants were killed by spraying in 1949, grass production in 1951 and 1952 averaged 590 pounds per acre.

GRASS PRODUCTION INCREASED

On other plots where fewer sagebrush plants were killed, grass production was also less. Increased yields of grass were nearly in direct proportion to sagebrush kills. Treatment costs, however, increased sharply to obtain sagebrush kills over 90 percent. Preliminary findings indicate that a point of diminishing returns may be reached somewhere around a sagebrush kill of 80 percent. At this level of kill the net increase in grass production (40 percent utilization) converted to pounds of beef is estimated currently to be worth about $1.50 to $2.00 per acre.



LESS SAGEBRUSH --- MORE GRASS

Increased grass production was not the only desirable result of sagebrush control. The openings between the sagebrush plants that were almost bare before treatment are now nearly covered by live vegetation. The thickening of the grass cover and a resulting accumulation of organic mulch will provide improved soil protection. This, in turn, should further increase grass production.

SOIL PROTECTION WAS IMPROVED

Cattle in the experimental area were attracted, possibly by the increase in available feed, to plots where sagebrush had been killed in previous years. Where utilization was measured, the desirable grasses were grazed nearly twice as heavily on sprayed plots as on adjacent unsprayed areas. These findings suggest that the sagebrush-control program should include measures to protect treated areas from too heavy grazing use. Failure to do so may result in damage to the desirable forage plants and favor reinvasion of sagebrush or other less desirable plants.

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Control may not be advisable on ranges where big sagebrush is an important browse plant for game or domestic livestock.

CATTLE LIKED THE RESULTS

Controlled tests showed that air and ground applications were about equally effective. The airplane is more practical, however, since it can spray an area in a few hours that would take days to treat with a tractor-mounted sprayer. Costs of airplane application depend chiefly on gallons of spray used per acre. In the Lander area there were also differences between operators in the amount charged to spray any given volume. Based on quotations from two operators, spraying costs using 1 pound of 2, 4, 5-T and 3 gallons of diesel oil per acre might range from $5.05 to $7.85 per acre. Costs could conceivably be lowered somewhat by submitting large spraying contracts to several operators for competitive bids.

RESEARCH FINDINGS BEING USED

ACKNOWLEDGEMENT

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(THE AUTHORS)